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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,251	08/30/2005	Heike Schluckwerder	10191/4057	1129

26646 7590 03/18/2008

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EXAMINER	
HEVEY, JOHN A	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
03/18/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,251	SCHLUCKWERDER ET AL.	
	Examiner	Art Unit	
	JOHN A. HEVEY	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/8/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1-14 are cancelled. Claims 15, 29-30, and 32 are currently amended. Claims 15-36 are pending and presented for examination.

Response to Arguments

1. Applicant's arguments with respect to claims 15-36 have been considered but are moot in view of the new ground(s) of rejection.

2. Applicant amends each of the independent claims 15, 29, and 30 to further include a ceramic filler having an oxygen content of 0.5-2.0 wt%. This new limitation changes the scope of the claimed invention and necessitates the 0new grounds of rejection presented below.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 15 and 22-28 rejected under 35 U.S.C. 103(a) as being unpatentable over Ayako et al. (Japanese Pub. No. 11-292616) in view of Mroz (US6054220).

A machine-generated translation of Ayako et al. accompanies this action. In reciting this rejection, the examiner will cite this translation.

In regards to claim 15 and 22-23, the instant claim is drawn to a glass-ceramic material comprising a matrix and ceramic filler, wherein the matrix contains lithium, silicon, aluminum, and oxygen. Ayako et al. teaches a glass-ceramic composition which comprises a filler and a glass matrix comprising SiO_2, Al_2O_3, Li_2O, as well as P_2O_5, MgO, ZnO, CaO, BaO, and TiO_2 (see Ayako claim 1) and further teaches the use of a filler less than 5 micrometers in average size (see [0031]). The reference is silent to the particular oxygen content of the filler. Mroz teaches an aluminum nitride powder, useful as a thermally conductive filler in the electronic encapsulation arts (see col. 1, lines 37-67), which comprises 1-10 wt % of a silicon dioxide coating layer (see Mroz claim 6). The reference further teaches surface coated-AlN powders with oxygen contents in the 2-4 wt % range are well known in the art (see col. 2, lines 13-35). Thus, it would have been obvious to one of ordinary skill in the art to modify the teachings of Ayako to substitute the disclosed fillers with the silica-coated aluminum nitride powder as taught by Mroz, to include a filler with 0.5-2.0 wt % oxygen content. One of ordinary skill would have been motivated to do so by the relatively low thermal expansion

coefficient, increased thermal conductivity, and decreased weight-gain due to the hydrophobic properties of the surface-coated aluminum nitride.

In regards to claim 24, Ayako teaches that the material includes beta-spodumene and/or beta-quartz crystalline phase (see Ayako claim 1).

In regards to claim 25, the solubility of nitrogen is an inherent material property. As Nagata teaches a glass-ceramic with the same components, it would inherently possess this property as well.

In regards to claims 26-27, the instant claims require the proportion of ceramic filler to be 25-60 vol % and 30-50 vol % respectively. Ayako et al. teaches the use of 5-70 wt % of fillers. The prior differs in that it uses weight percent instead of volume percent, however if converted it is believed that the ranges would clearly overlap. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the overlapping portion of the ranges taught by the reference because overlapping ranges have been held to establish prime facie obviousness. See MPEP 2144.05. Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to select from the overlapping portions of weight percent ranges, which also overlap the volume percent ranges as recited in claim 26-27.

In regards to claim 28, the heat conductivity is an inherent material property. As Nagata teaches a glass-ceramic with the same components, it would inherently possess this property as well.

8. Claims 29-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ushifusa et al (US4821142) in view of Mroz (US 6054220).

Claim 29 is an independent claim drawn to a ceramic foil, ceramic laminate or microhybrid comprising a glass-ceramic comprising lithium, silicon, aluminum, and oxygen. Ushifusa teaches a laminated ceramic circuit board comprised of layers of a glass-ceramic material comprising silicon, aluminum, lithium, and oxygen, in addition to potassium and calcium (see Ushifusa claim 2).

The reference teaches the use of a filler (see col. 3, lines 22-47) but is silent to the particular oxygen content of the filler. Mroz teaches an aluminum nitride powder, useful as a thermally conductive filler in the electronic encapsulation arts (see col. 1, lines 37-67), which comprises 1-10 wt% of a silicon dioxide coating layer (see Mroz claim 6). The reference further teaches surface coated-AlN powders with oxygen contents in the 2-4 wt% range are well known in the art (see col. 2, lines 13-35). Thus, it would have been obvious to one of ordinary skill in the art to modify the teachings of Ushifusa to substitute the disclosed filler with the silica-coated aluminum nitride powder as taught by Mroz, to include a filler with 0.5-2.0 wt% oxygen content. One of ordinary skill would have been motivated to do so by the relatively low thermal expansion coefficient, increased thermal conductivity, and decreased weight-gain due to the hydrophobic properties of the surface-coated aluminum nitride.

Claim 30 is an independent claim drawn to a method for producing a glass ceramic composite material, ceramic foil, ceramic laminate, or microhybrid comprising the steps of:

-melting a glass having the composition seen in Table 1

Table 1

Component	Instant claims 16-17	Ushifusa
SiO_2	20-68	20-85
Al_2O_3	10-25	0-25
Li_2O	5-20	2-20
B_2O_3	0-35	0-50
P_2O_5	0-10	0-5
Sb_2O_3	0-10	
ZrO_2	0-3	0-5

-converting the glass to a powder

-mixing a ceramic filler having an oxygen content of 0.5-2 wt % in with the glass powder

-sintering the powder mixture

Ushifusa teaches a method of producing a glass-ceramic laminate material with steps of: fusing a composition of glass powder (overlapping composition range can be found in Ushifusa table 1, or claim 1), quenching then pulverizing the glass to a powder, silica microspheres are added (equivalent to ceramic filler) to the glass powder, binder,

plasticizer, and solvent compounds are added to the mixture, the mixture is then coated on a substrate, machined, laminated, then fired (equivalent to sintered)(see Ushifusa columns 6-7, example 1).

The reference teaches the use of a filler (see above) but is silent to the particular oxygen content of the filler. Mroz teaches an aluminum nitride powder, useful as a thermally conductive filler in the electronic encapsulation arts (see col. 1, lines 37-67), which comprises 1-10 wt% of a silicon dioxide coating layer (see Mroz claim 6). The reference further teaches surface coated-AlN powders with oxygen contents in the 2-4 wt% range are well known in the art (see Mroz col. 2, lines 13-35). Thus, it would have been obvious to one of ordinary skill in the art to modify the teachings of Ushifusa to substitute the disclosed filler with the silica-coated aluminum nitride powder as taught by Mroz, to include a filler with 0.5-2.0 wt% oxygen content. One of ordinary skill would have been motivated to do so by the relatively low thermal expansion coefficient, increased thermal conductivity, and decreased weight-gain due to the hydrophobic properties of the surface-coated aluminum nitride.

In regards to claim 31, Ushifusa teaches the use of 0-5% aluminum nitride in the material (see Ushifusa claim 1).

In regards to claim 32, Ushifusa teaches a firing (sintering) step (see Ushifusa example 1).

In regards to claim 33, Ushifusa teaches the powder mixture is pressed and laminated at a pressure of 25 kgf/cm2 before firing (see Ushifusa example 1, column 7, lines 43-45).

In regards to claim 34, Ushifusa teaches the powder mixture formed into films (equivalent to foils), then laminated (see Ushifusa example 1, column 7).

In regards to claim 35, Ushifusa teaches the material fired at a maximum temperature of 850-960 C in air (see Ushifusa example 1, column 7) or in a nitrogen atmosphere (see example 2, column 9).

In regards to claim 36, Ushifusa teaches polyvinyl butryal as a binder, butylphthalyl buylglycolate as a plasticizer, and trichloroethylene, tetrachloroethylene, and n-butyl alcohol as a solvent are added to the powder mixture (see Ushifusa example 1, columns 6-7).

10. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayako et al. (Japanese Pub. No. 11-292616) in view of Mroz (US6054220), further in view of Nagata et al. (US6514890).

Ayako teaches glass composition ranges which overlap the ranges claimed in 16-19, but differs in that it does not disclose the use of optional components of 3-33 wt% B_2O_3, 2-5% P_2O_5, 1-5% Sb_2O3, and 1-2% ZrO_2 as required by claims 20-21. However, it would have been obvious to one of ordinary skill in the art to modify the composition taught by Ayako with the glass-ceramic composition taught by Nagata who discloses the use of said optional components in clearly overlapping ranges (see Nagata table 2). One would have been motivated to make such a modification in order

to lower the melting temperature in the case of boron (see Nagata column 3, lines 27-36) or as nuclei for precipitation in the case of zirconium (see Nagata column 2, lines 51-66). A table of the requirements of the instant claims and teachings by the prior art is shown below (all in wt%):

Table 2.

Component	Instant claims 16-17	Instant claims 18-19	Ayako (see claim 1)	Nagata (see claims 1, 4-5)
SiO2	20-68	48-66	50-62	65-80
Al2O3	10-25	14-22	22-26	6.5-15
Li2O	5-25	4-20	0-5	3-15
B2O3	0-35	0-20		0-15
P2O5	0-10	0-5	5-10	.2-5
Sb2O3	0-10	0-5		0-5
ZrO2	0-3	0-2		.1-.8

The claimed ranges would have been obvious to one of ordinary skill in the art given the prior art's teachings. Nagata further teaches specific examples which sufficiently read on the instant claims (see Nagata example 2, table 2). No distinction is made between the claims 16-17 and 18-19 respectively for a 'matrix contains' or 'starting mixture contains' as no significant difference between the two is expected in the final composition from the given claims.

Conclusion

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN A. HEVEY whose telephone number is (571)270-3594. The examiner can normally be reached on Monday - Friday 7:30 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jah

/Jerry A Lorengo/

Supervisory Patent Examiner, Art Unit 1793